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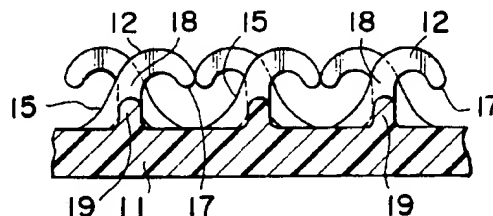
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(54) **Synthetic resin surface fastener including integrally molded hooks.**

(57) A surface fastener member comprises a base (11) and a plurality of hook elements (15) which are integrally formed by extrusion or injection molding. The hook elements (15) of the surface fastener member grip with a companion pile-like surface fastener member carrying an interior finish material so as to fasten the interior finish material to an automobile ceiling, for example.

FIG. 3



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BACKGROUND OF THE INVENTION

1. Field of the Invention:

This invention relates to a synthetic resin surface fastener including a base and hook elements which are integrally molded, and more particularly to a synthetic resin surface fastener member having hook elements which can assure a very strong intermesh with a companion surface fastener member.

2. Description of the Related Art:

There have been known a number of surface fasteners in each of which a base and hook elements protruding from the base are integrally molded. A plurality of methods have been proposed to produce such surface fasteners.

Japanese Patent Publication No. 53712/1982 discloses one of such methods, for example. In this method, a flat base and straight projections are molded integrally first. Then tips of the straight projections are pressed to and moved along semi-circular grooves formed on a die so as to be in the shape of hook. In this case, when the grooves have random directions, the hooks will also have random directions, thereby assuring a very strong grip with a companion surface fastener member.

However since it is very difficult to mate the tips of the straight projections with the grooves, and since the hooks are not produced in one step, not only manufacturing processes are complicated but also respective hooks are difficult to face desired directions. In addition, it is very difficult to shape the hooks as predetermined. Therefore the hooks will not be shaped uniformly, and cannot assure a strong grip with the companion fastener member. For these reasons, this method has not yet been in practical use.

With a method exemplified in Japanese Patent Publication No. 22768/1973, both of a base and hook elements are formed integrally by extrusion molding at a time, and the hook elements are shaped in succession. In this method, a plurality of die discs and spacer discs are piled one over another so as to obtain a mold drum. Then melted thermoplastic resin is extruded onto the surface of the mold drum, being pushed into mold cavities on the die discs. The resin on the surface of the mold drum is pressed to form a base, being cooled. Then the spacer discs are retracted inwardly so as to scrape a strip of molded fastener member from the surface of the mold drum. Each of the die discs has a number of hook-shaped cavities which are spaced as predetermined and extend toward the center from the circumferential edge of the disc. The spacer discs have smooth surfaces. The spacer

discs are necessary because one die cannot have cavities shaped in complete conformity with the contour of the hooks. In addition, since the cavities on each die disc face the circumferential direction of the die disc, the hooks have the direction same as that of the cavities. Therefore, all of the hooks have the same direction. It is difficult to change the direction of the hooks.

The existing surface fasteners have hooks which usually face one direction, which means a fastening force of the surface fasteners is directional, thereby adversely affecting strong fastening and easy unfastening of the surface fasteners.

SUMMARY OF THE INVENTION

It is therefore an object of this invention to provide a surface fastener member which is integrally molded and which can assure a very strong grip in any direction by taking advantage of directionality of the molded hooks.

According to this invention, there is provided a synthetic resin surface fastener member comprising a flat base and a plurality of hook elements bristling from one surface of the flat base, both being molded integrally, wherein the hook elements are arranged in two or more sections, and the hook elements in one section and those in sections adjacent thereto face directions perpendicular to one another.

This invention is contemplated by taking advantage of the directionality of the hook elements determined when the hook elements are molded. Therefore, a number of hook elements having the same direction compose one group while hook elements having a direction perpendicular to that of the foregoing hook elements compose another group. Groups of the hook elements facing in the opposite directions are alternately molded side by side on the same base.

When each row of hook elements facing the same direction and each row of hooks facing the opposite direction are alternately arranged side by side, when each row has hook elements facing opposite directions, or when adjacent groups of hook elements are perpendicular to each other in the direction of the hook elements, the surface fastener member including the foregoing hook elements can assure a very strong and uniform intermesh with its companion surface fastener member throughout the whole surface area.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a bottom plan view showing one typical example of an integrally molded surface fastener according to an embodiment of this invention;

FIG. 2 is a front elevation of the surface fastener of FIG. 1;

FIG. 3 is a side elevation of hook elements, in enlarged scale, of the surface fastener; and

FIGS. 4 and 5 are bottom plan views showing arrangements of hook elements of circular surface fastener members.

DETAILED DESCRIPTION

A typical example of a surface fastener according to this invention will now be described with reference to the accompanying drawings.

In the drawings, reference numeral 11 stands for a base which has hook elements 15 extending from a surface thereof and a clamp 13 protruding from the other surface thereof. The clamp 13 is adapted to be attached to a non-illustrated mounting base on which an interior finish material is to be installed in an automobile, for example. The base 11, hooks 15 and clamp 13 are integrally produced by extrusion or injection molding so as to serve a surface fastener member 1. The surface fastener member 1 is installed on a ceiling reinforcement 2, for example on an automobile ceiling, as follows. The clamp 13 of the surface fastener member 1 is inserted through an opening 131 of the ceiling reinforcement 2 so that the ceiling reinforcement 2 is sandwiched by the clamp 13 and the base 11 of the surface fastener member 1. Then a pile-like surface on the rear surface of an interior finish material is made to intermesh with hook heads 12 of the surface fastener member 1, so that the interior finish material is installed on the ceiling reinforcement 2.

As described above, the hook elements 15 are arranged in two or more sections. The hook elements 15 in the respective sections are arranged so that their directions are perpendicular one another. In the embodiment shown in FIGS. 1 and 2, the hook elements 15 are arranged in four sections by quartering the square base 11. However, the number of the sections is not limited to four. In addition, the number of the sections depends upon the shape of the base 11. When the base is circular, the hook elements 15 will be arranged in sections as shown in FIGS. 4 and 5.

Arrangement and typical shapes of the hook elements will be described with reference to FIGS. 1 to 3. As shown in FIG. 3, each hook element 15 looks like the crest of a wave in cross sectional outline. The lateral cross sectional area of the hook element 15 is decreased gradually from a bottom toward a tip 17. Specifically a portion 18 at which the hook element 15 extends straight from the base 11 is slightly and gently sloped toward the tip 17. The front of the hook element 15 is substantially upright. Reinforcing ribs 19 extend from opposite

sides of the hook element 15. The shape of the hooks shown in these drawing figures is given as an example, and is not limited to the example.

A plurality of the hook elements 15 having tips facing the same direction and/or those facing the opposite direction according to the structure of mold dies are arranged in rows on the base 11. In this embodiment, rows 121 of the hook elements facing the same direction and rows 122 of the hook elements facing the opposite direction are alternately arranged so as to form a section A. In sections B and C adjacent to the section A, the rows 121 and 122 are arranged so as to be perpendicular to those of the section A. In the section D adjacent to the sections B and C, the arrangement of the rows 121 and 122 are the same as that in the section A. The surface fastener member 1 of this embodiment has four hook groups in the sections A, B, C and D. The rows of the hook elements, i.e. the directions of the hook elements 15, in adjacent two sections, are perpendicular to one another. Each section is equal in the area, i.e. the sections A and D are equal in size while the sections B and C are equal in size.

With the foregoing arrangement, the hook heads 12 of the hook elements 15 of the surface fastener member 1 face at least four directions. Therefore the surface fastener member 1 can grip completely with a flexible pile-like surface of the companion surface fastener member, providing a strong fastening force throughout the intermeshing areas.

The surface fastener member having the integrally molded hook elements can demonstrate a uniform fastening force throughout its whole surface area.

Claims

1. A synthetic resin surface fastener member comprising a flat base (11) and a plurality of hook elements (15) bristling from one surface of said flat base (11), both being molded integrally, wherein said hook elements (15) are arranged in two or more sections, and said hook elements (15) in one section and those in sections adjacent thereto face directions perpendicular to one another.

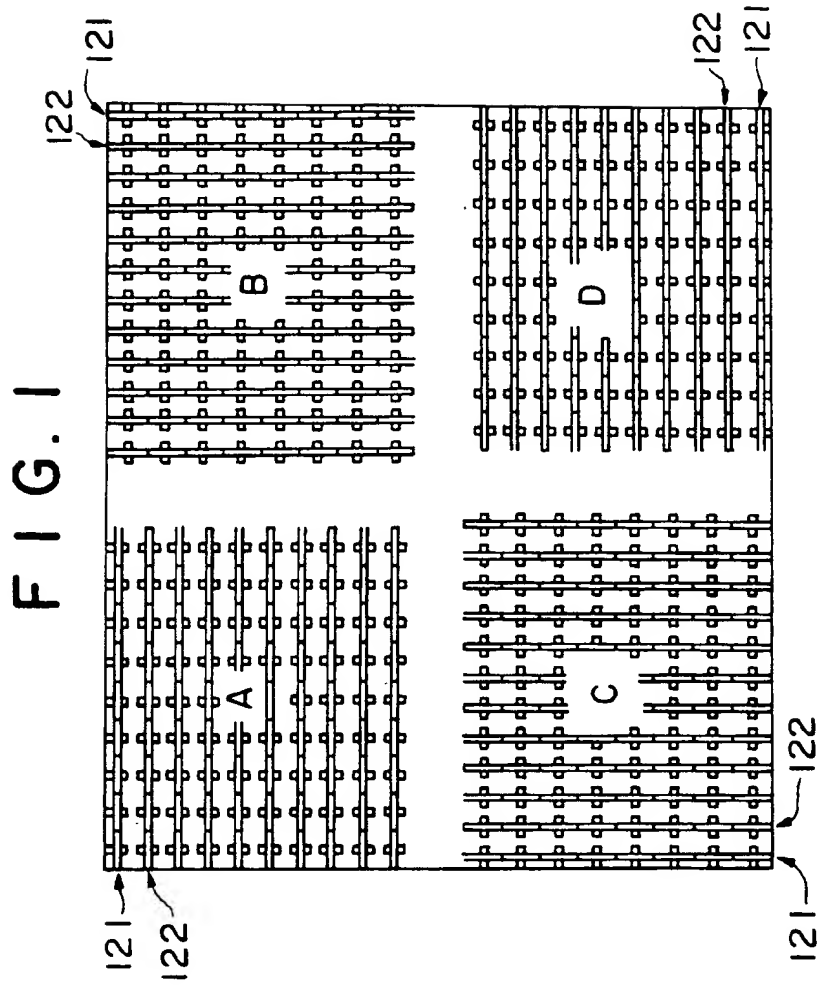


FIG. 2

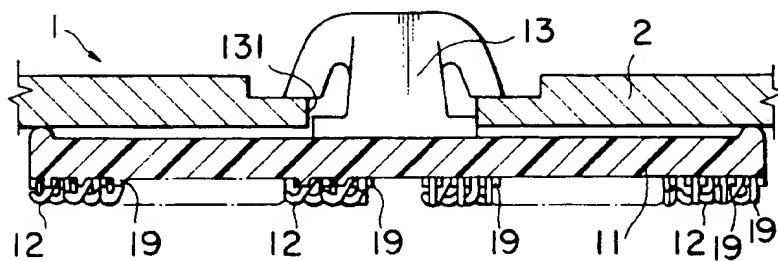


FIG. 3

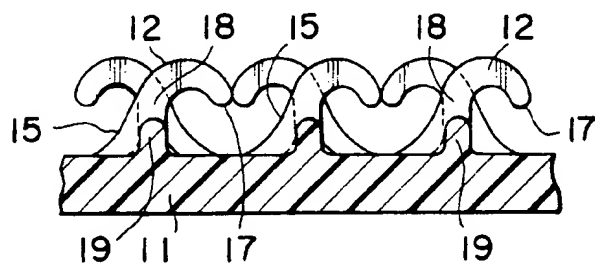


FIG. 4

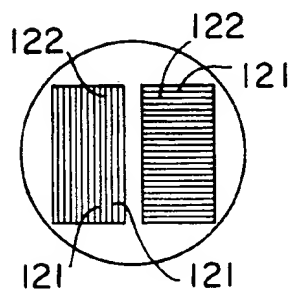
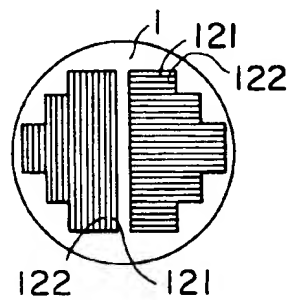


FIG. 5





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EUROPEAN SEARCH REPORT

Application Number

EP 91 11 0894

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	US-A-3 020 613 (L. H. MORIN) * column 2, line 5 - column 3, line 65; claim 1; figures 1-6 ** -- --	1	A 44 B 18/00
A	US-A-4 001 366 (G. C. BRUMLIK) -- --	1	
A	US-A-4 672 722 (J. MALAMED) -- -- --		
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			A 44 B A 61 F F 16 B B 65 D
The present search report has been drawn up for all claims			
Place of search		Date of completion of search	Examiner
The Hague		18 October 91	GARNIER F.M.A.C.
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